



Fall 2023

Climate



Nurturing Climate Advocates through Drone Education

By Ebony Hood, Syatt

During immersive after-school programs and summer camps, students learn to foster environmental awareness and action through drone piloting—what better way to teach flight dynamics than through old-fashioned paper airplane flight competitions? Of course, it isn't all fun and games. The curriculum not only covers the physics of flight but also talks about compliance with Federal Aviation Administration (FAA) regulations, including how students can obtain a hobbyist registration and eventually licensure. Once the basics are grounded, it's time to explore environmental stewardship.

Students cover an innovative inter-section where drone technology

converges with climate issues. Merging hands-on piloting experience with exploring drones' ecological applications, students learn about conducting aerial surveys that monitor forestation and habitat alterations. They were also introduced to mapping tools designed for the assessment of tree canopy coverage. Drones have significantly changed scientific investigation allowing more aerial coverage that would typically be time-consuming, potentially dangerous, and in many cases, not even feasible. Through this work, students expand not only their technological expertise but also their comprehension of our planet's dynamics.



Brainstorming new drone designs to help mitigate climate issues

Continued on page 2

Save the Date

101 Alternatives to the Chalkboard Conference

Oct 7, Camp Kern, Oregonia

<https://eeco.wildapricot.org/>

NAAEE23: Together We Thrive

Virtual, various dates throughout October

<https://conference.naaee.org/about>

OEEF Letter of Intent Deadline

January 9, 2024

www.epa.ohio.gov/oeef

OEEF Grant Submission Deadline

January 16, 2024

www.epa.ohio.gov/oeef

WINTER Snow Conference

January 26-27, Camp Nuhop, Perrysville, Ohio

www.eeco-online.org

Student Wildlife Research Symposium and EECO Annual Conference

April 11- 14, Salt Fork State Park Lodge



Digital mapping tools

Drone Education Continued

Drone education empowers students to champion the cause of environmental preservation and environmental justice while exploring careers that interweave drone technology and climate advocacy such as environmental monitoring specialists, climate researchers, conservation analysts, renewable energy assessors, and more. With the global spotlight beaming on climate issues, this initiative provides a solid stepping stone toward a multitude of professional paths dedicated to working toward a sustainable future.

There's an entrepreneurial dimension to this work as well.

Equipped with the skills honed through this program, students can envision launching their own businesses. They might offer drone services to environmental organizations, aiding in data collection for conservation projects or climate impact assessments. By proactively navigating this entrepreneurial trajectory, students harness their talents not only to champion sustainability but also to carve a distinctive niche within the realm of climate technology. It's a win for the planet and for the students.

To learn more here: <https://uavistasllc.com/>

Climate and Ticks

**By Harrison Shupe and Ellie Mantel,
Interns at Warren County Soil and Water Conservation District**

Hotter summers are not the only way that climate change is impacting human health. Some of Ohio's most notorious blood thirsty critters are becoming a growing threat as temperatures rise. Ticks (Ixodida), most known for carrying Lyme disease, have increased their range and prevalence in the Midwest in recent years. When there are more ticks, there are more tick diseases too. According to the National Center for Biotechnology Information, the number



Lone Star Tick, Judy Gallagher, Flickr

of bacterial and protozoan diseases transmitted by ticks has increased by over 200% from 2004-2016 (NCBI.gov). Although Lyme disease is by far the most common, there are other diseases that ticks can harbor, many of them even more dangerous than Lyme disease. The diseases Babesiosis, Tularemia, Rocky Mountain Spotted Fever, and Anaplasmosis are all known to be commonly spread by tick bites in the Midwest. The Lone Star tick (*Amblyomma americanum*), is known to cause Alpha-Gal syndrome, a newly described ailment which renders the afflicted individual allergic to red meat such as beef, pork, and venison. Alpha-Gal syndrome has increased in the US from just 12 cases in 2009 to over 34,000 cases in 2019. Although climate change is not the only factor increasing these diseases, it plays a significant role.

The mild winters and prolonged summers associated with climate change are increasing the habitable range for these parasitic arachnids. Ticks often stow-away on mobile host animals such as white-tailed deer, birds, squirrels, and other mammals. The National Collaborating Center for Environmental Health says projected temperature increase is allowing ticks to increase

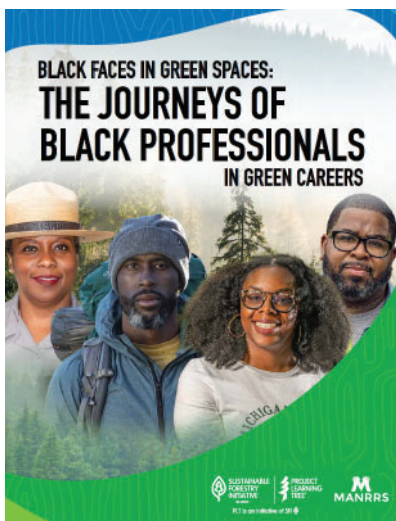
their range northward by around 21-34 miles per year (NCCEH.ca). The spread of tick-borne diseases follows this northward pattern, rendering more people vulnerable to ticks each year.

To protect yourself from ticks, check your body after spending time outdoors, and always apply an FDA approved insect repellant. Ticks tend to seek warm, humid locations on the host. Take special care when walking through tall grasses or overgrown areas, and research proper tick removal if you find a tick embedded in the skin. As always, be aware and informed in the outdoors, be safe, and have fun!

Black Faces in Green Spaces: The Journeys of Black Professionals in Green Careers

Black Faces in Green Spaces: The Journeys of Black Professionals in Green Careers is a career resource guide developed in partnership with Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS). This guide introduces youth to the many jobs in the forest and conservation sector through the lens of Black Professionals currently working in the sector.

22 Black professionals from different backgrounds, ages,



and disciplines share the journey to their careers starting with their introduction to nature, the challenges they overcame in the workplace, why mentorship is critical, and their advice to the next generation.

Guide is available as a free pdf from PLT at <https://shop.plt.org/Shop/ProductDetails/journeys>

Climate Resources for Educators

US EPA

<https://www.epa.gov/climate-change/climate-change-resources-educators-and-students>

NASA Lesson plans and resources

<https://climate.nasa.gov/for-educators/>

NASA Climate Kids

<https://climatekids.nasa.gov/>

NOAA

<https://www.climate.gov/teaching>

Commons Open Education Resources

<https://oercommons.org/hubs/climate>

US Global Change Research Program

<https://www.globalchange.gov/browse/educators>

Cornell Climate Stewards

<https://climatestewards.cornell.edu/resources-2/youth/>

Scripps Institute of Oceanography

<https://scripps.ucsd.edu/research/climate-change-resources/climate-change-teacher-resources>

Climate Science Alliance's Climate Kids

<https://www.climatekids.org/>

National Geographic Kids

<https://www.natgeokids.com/uk/discover/geography/general-geography/what-is-climate-change/>

Project EDDIE (Environmental Data-Driven Inquiry and Exploration) curriculum and datasets.

Project EDDIE offers workshops training teachers to use the curriculum.

<https://serc.carleton.edu/eddie/index.html>

Climate Literacy Booklet

The U.S. Global Change Research Program, a collaboration of 13 federal agencies

<https://downloads.globalchange.gov/Literacy/ClimateLiteracyBookletLow-Res.pdf>

State Climate Office of Ohio

Background info about Ohio, not an educator resource as such.

<https://climate.osu.edu/ohio-climate-change-resources>

Join Us

By joining EECO, you will receive:

- A network of professional educators exchanging new ideas, resources, and techniques in EE
- Periodic email newsletters with links to events, job opportunities, and updates about EE in Ohio
- Outstanding EE publications and resources
- Annual statewide and regional conferences
- Regional professional development workshops
- Special member rates for conferences, workshops, and publications as specified
- An opportunity to participate in a variety of committees & activities to promote innovative EE
- Peer recognition of professional efforts through EECO's Awards program

<https://eeco.wildapricot.org/joinus>

ODNR's Conservation Honors

Ohioans who have dedicated their lives to the conservation and preservation of Ohio's natural resources received top honors from the Ohio Department of Natural Resources. Family, friends, and many others watched as Ohio Governor Mike DeWine, ODNR Director Mary Mertz, and other ODNR officials inducted seven people into the Ohio Natural Resources Hall of Fame and awarded seven others with ODNR's Cardinal Award. Congratulations to all of the awardees, especially those with strong ties to EECO

The Ohio Natural Resources Hall of Fame: Carolyn Watkins

The Ohio Natural Resources Hall of Fame was created in 1966 to celebrate individuals who have made significant contributions to protecting Ohio's natural resources.



Carolyn Watkins has been an exceptional advocate for environmental and conservation-focused education for more than 30 years. As chief of the Office of Environmental Education at the Ohio Environmental Protection Agency since 1998, Watkins has played a pivotal role in securing millions of dollars in grants for conservation efforts and has personally taught various curricula to thousands of students and educators. Watkins has used her education and experience to give back through countless hours on the job, out in the field, and as part of numerous organizations. Along with her contribution to Project WET, Project WILD, and many other nature-based

learning programs, she's worked alongside ODNR as a facilitator for Project Learning Tree. Project Learning Tree is the Division of Forestry's environmental education standard, teaching children how to think through the lens of trees and forests. Watkins' involvement in many organizations and professional associations -- including the Environmental Education Council of Ohio, North American Association for Environmental Education, Ohio Energy Project, and the Cuyahoga Valley National Park Conservancy -- has left a lasting impact and inspired countless individuals to take up the cause. Watkins is also the recipient of the Division of Forestry's John Hug Award for outstanding leadership in environmental education, the Environmental Education Council's Lifetime Achievement Award for environmental education in Ohio, and many other awards.

The Ohio Natural Resources Hall of Fame: Paul E. Knoop, Jr.

Paul Knoop's career spanned 35 years as education director at Aullwood Audubon Center and Farm. He was handpicked by Marie Aull, a Dayton-area philanthropist and founder of the nationally renowned Vandalia nature center in 1957. In 1995, Aullwood opened the Paul Knoop Prairie adjacent to the farm near Dayton International Airport. With its hundreds of native plant species, the park is a utopia of biodiversity and protects 120 acres of watershed for the Wiles Creek.



After retirement, Knoop and his wife Cathy moved to Hocking County and continue to be involved in nature education. They both teach natural history field classes for Ashland University and lead wildflower hikes at the Land Conservancy Arc of Appalachia. Knoop co-wrote "The Birds of Hocking County, Ohio", published in 2016.

Knoop has earned many honors, including the George B. Fell Award, given by the Natural Areas Association to individuals who exhibit the highest qualities of the natural areas profession and who have made significant and sustained advancements in natural area identification, protection, stewardship, or research.

Paul is a founding member and the inaugural secretary of the Appalachia Ohio Alliance. Founded in 2001, the Alliance preserves and restores natural ecosystems, facilitates the protection of historical landmarks, and supports educational and outreach activities in Ohio's Appalachia region.

The Cardinal Award: Brenda Metcalf

In addition to the Hall of Fame inductions, ODNR also presented the Cardinal Award to seven Ohioans. This award honors individuals and organizations that demonstrate exceptional awareness and concern for ideals reflected in the department's mission statement: To ensure a balance between the wise use and protection of our natural resources for the benefit of all. Cardinal Award recipients have included outdoor writers, educators, farmers, biologists, naturalists, businesses, sporting organizations, and volunteers across the state of Ohio.

As the Environmental Education Council of Ohio's Executive Director for the past 20 years, Brenda Metcalf has never stopped moving environmental education in Ohio forward. Metcalf has developed quality relationships with the Ohio EPA through their Partnership Grant that supports the Environmental Careers Program.

This program reaches thousands of Ohio students with career messages and resources, connects them with professionals in the environmental fields, and provides materials to support exploration of those potential career paths. In addition, Metcalf's partnership with the Ohio Department of Education helped foster the Ohio Environmental Literacy Plan in 2012- one of the first in the country. This plan outlines all the key benchmarks that Ohio students and adults should achieve to become educated, connected stewards of Ohio's environment. Finally, Metcalf has fostered a long-term positive relationship with ODNR through her constant support of Project WILD, Project Learning Tree, and other initiatives. She has a long partnership with the Ohio Division of Wildlife through a grant to support highschool research on wildlife and their habitats, support of the Ohio Student Wildlife Research Symposium, through the EECO regional director networks that regularly host Project WILD workshops, and the promotion of our resources and materials through her outreach efforts into classrooms and conference displays.



Is Your Organization Listed?

EECO is working with Go Green Go to create a comprehensive database of Environmental Organizations in Ohio. Currently, 262 organizations are listed. Is yours? Check out the database at gogreengo.org

If you are not listed PLEASE fill out this survey. Also, if your organization's information has changed, please let us know.

[GOGREENGO Survey](#)

This listing will allow the community to discover you, and you to discover potential partners for projects.

Environmental Professionals Network Breakfast

September 12

Rivers and Parks + Imagination + Design

How to utilize Ohio's rivers to stimulate and enhance community and economic development.

Cost: \$25 for non-students, \$5 for students, and free for virtual participants. Register online at <https://cvent.me/eBx4eZ?RefId=EPN+Webpage>

Location: Nationwide and Ohio
Farm Bureau 4H Center, 2201 Fred Taylor Dr, Columbus, OH 43210

Agenda: Doors open at 7:15 am with breakfast served at 7:40 am. 8 am, livestreaming begins for virtual attendees. 11:45 am the program concludes.

Find out more at <https://epn.osu.edu/events/epn-breakfast-tuesday-september-12-2023-rivers-and-parks-imagination-design-how-utilize-ohios>





Ohio Environmental Education Fund

The OEEF was created by the General Assembly in 1990 to enhance Ohio citizens' awareness and understanding of environmental issues. It is administered by the Director of the Ohio Environmental Protection Agency (Ohio EPA) and provides approximately \$1 million annually in grants to support environmental education efforts within the state of Ohio. The OEEF derives its funds from one-half of the civil penalties collected from violations of Ohio's air and water pollution control regulations. <https://epa.ohio.gov/oeef/>

Grant Applications

The Ohio Environmental Education Fund (OEEF) invites applications for mini grants (\$500 - \$5,000) and general grants (\$5,000 - \$50,000) for education projects targeting pre-school through university students and teachers, the general public, and the regulated community. Prospective applicants can start the application process by opening an account in Ohio EPA's eBusiness Center at <https://ebiz.epa.ohio.gov/>

Ohio EPA encourages OEEF applicants to discuss their proposal ideas with OEEF staff members before completing their applications. OEEF staff members will be happy to provide a pre-review of draft applications as they are under development in the online grant service.

Electronic Letter of Intent Deadline is due January 9, 2024.

Application Deadline is 5:00 p.m January 16, 2024.

Upcoming Grant Writing Workshops

Registration is required for these FREE workshops at dennis.clement@epa.ohio.gov or call 614-644-2048 for additional information. **Registration is by e-mail only.** When registering, please include your name and contact information (e.g., phone number) where you can best be reached.

The deadline to register will be the Friday before each workshop or until the workshop is full at 30 participants.

Lunch will not be provided.

Thursday, September 14, 2023

10:00 AM - 4:00 PM

Pickaway Soil and Water Conservation District, Pickaway County Service Center
110 Island Rd. Circleville, OH 43113

October 5, 2023, 10:00 AM - 4:00 PM

Muskingum County Public Library
220 N. Fifth St. Zanesville, OH 43701

Grant Writing Workshops

The Ohio EPA Office of Environmental Education typically offers grant writing workshops around the state throughout the year. If interested in finding out more, please contact Dennis Clement at dennis.clement@epa.ohio.gov

- Grant Writing 101: Finding the Right Funder. Prospecting tips to help you identify foundations, corporations, and government grant programs, and how to approach different kinds of grantmakers.
- Grant Writing 102: Writing a Winning Proposal. How to avoid common mistakes applicants make, and develop realistic objectives, activities, and budgets. OEEF will be referred to during this session.

WOW! Wonders of Wetland Educator Workshop

Saturday, October 21, 2023

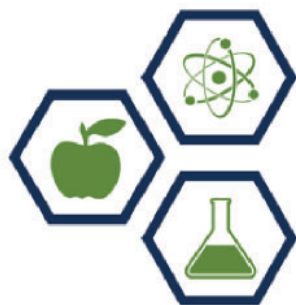
Deer Haven Park, Delaware, Ohio

WOW! The Wonders of Wetlands is an instructional guide for educators that provides a creative collection of wetland activities, information, and ideas. WOW! includes more than 50 hands-on, multi-disciplinary activities in lesson plan format, extensive background information on wetlands, ideas for student action projects, and a wetlands resource guide. This workshop is open to environmental educators, teachers (informal and formal), volunteers and anyone interested in learning how to educate others about wetlands. There is a \$10.00 fee which will cover lunch/drinks costs. The WOW! Guidebook is being provided by the Ohio EPA, Office of Environmental Education.

Registration required by Friday, October 6, 2023.

https://www.wmao.org/content.aspx?page_id=4002&club_id=259593&item_id=2026812

For more information, contact Dennis Clement at dennis.clement@epa.ohio.gov or (614) 644-2048



30th Annual OCTC

TIE Conference

Teachers, Industry & Environment Conference

October 18-20, 2023 in Columbus

The Ohio Chemistry Technology Council's Teachers, Industry and Environment (TIE) Conference is an exciting "hands on" experience for Ohio's 3rd through 8th grade science educators and is completely free through the support from the chemical manufacturing industry. The TIE Conference provides educators with a wide-range of science experiments and classroom tools that create interesting and entertaining lessons for students.

- The TIE Conference is aligned with state science teaching standards for STEM curriculums.
- Participating educators have the opportunity to visit a working facility that produces sophisticated chemicals for the health care and personal products industries.
- The TIE Conference materials provide educators with an abundance of information on the resources available to them, most at no cost.
- Hands-on demonstrations and experiments provide educators with interesting and exciting tools that are easily adaptable to the classroom.
- The TIE Conference provides networking opportunities for educators to share experiences and ideas with other educators.
- Educators have direct interaction with the Ohio Environmental Protection Agency and representatives from the chemical manufacturing industry.
- Graduate credits from Ashland University available (optional for all participants).

<http://www.ohiochemistry.org/aws/OCTC/pt/sp/tieconference>

Girl Scout Tree Promise & Climate Challenges

Girl Scouts have pledged to take 5 million actions to address climate change by planting, protecting, and honoring trees to support wildlife conservation and ease the negative effects of climate change. In partnership with the Elliott Wildlife Values Project, American Forests, and The Arbor Day Foundation, we have already planted tens of thousands of trees in all 50 states and globally but we must keep going!

Tree Promise Toolkit

Find out more, including the free Tree Promise Toolkit, record tree plantings, and view tree activities at <https://www.girlscouts.org/en/activities-for-girls/for-every-girl/tree-promise.html>

Girl Scout Climate Activities

There are free activity guides for k-5 and 6-12 students available for download.

<https://www.girlscouts.org/en/activities-for-girls/for-every-girl/girl-scout-climate-challenge.html>

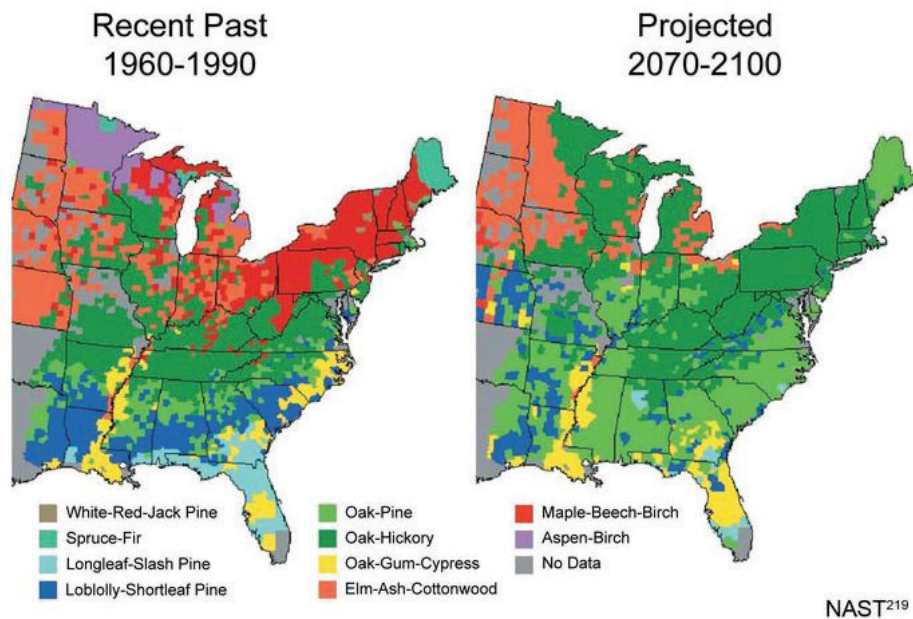
Project Learning Tree's Girl Scout Correlations

Correlations are available for all levels of girl scouts at <https://www.plt.org/alignment-to-standards/nonformal/girl-scouts/>



Climate Change and Its Impacts on the Urban Forest

By David S. Bienemann, Municipal Arborist, City of Hamilton



The maps show current and projected forest types. Major changes are projected for many regions. For example, in the Northeast, under a mid-range warming scenario, the currently dominant maple-beech-birch forest type is projected to be completely displaced by other forest types in a warmer future.²⁴³

U.S. Climate Program office (globalchange.gov)

USDA Plant Hardiness Zone 8 Climate Change Research

From Nov 2021 to the present, the City of Hamilton is partnering with Dr. Don Cippolini, Professor/Director of Environmental Sciences PhD. Program at Wright State University and Hamilton Conservation Corps to do a climate change study on trees from USDA Plant Hardiness Zone #8 to be planted at the Riverside Natural Area (RNA) located in Hamilton.

The goal is to be prepared for the impact climate change has on trees, and to plant the appropriate tree species in Hamilton (Butler County), Ohio that will live for the next 50 to 100 years in USDA Plant Hardiness Zone 8.

In addition to northern red oak, white oak, cherrybark oak, southern red oak, willow oak, water oak, and live oak, we planted southern magnolias, holly, and olive. The trees came from multiple southern state nurseries.

A combination of MS or PhD candidate(s) along with Urban Forestry Interns are assisting in this research project.

To better understand climate change and the impact it has on local urban forests, a research project is underway in Hamilton, Ohio.

As urban forests across the country have been impacted, it's important to review past research and evidence presented. How has climate change affected urban forests across the country? What does that tell us about the impacts we may see locally in the future?

US Forest Researchers are tracking trees migrating to the north and Midwest as the weather patterns are shifting across the states. The Midwest is receiving more rainfall than the SW, W, and SE states based on records since 1950. Southern pine beetles are moving into new areas such as the pine barrens in New Jersey. Previously, the weather was too cold in those areas to allow the advancement of southern

pine beetles. Many ticks have moved from the south up into the Midwest and New England as a result of higher temperatures. Ticks are showing up in Ohio as early as mid-March based on records from the Ohio Department of Health Entomologist. For example, when I moved to Ohio in 1990, the plant hardiness zones were 5a (-15 to -20F), 5b (-10 to -15F), 6a (-5 to -10F) and 6b (0 to -5) along the Ohio River. In 2020, the plant hardiness zones in Ohio had shifted to 5b (-10 to -15F), 6a (-5 to -10F) and 6b (0 to -5) in the counties along the Ohio River. That's a 5 degree temperature increase in just 30 years.

Eastern US Forests are already starting to look different based on forest inventories taken from 1980 to 2000. Dr. Lucy Braun's original inventory in the 1950s showed a domain forest species in the eastern US such as mixed mesophytic, oak-hickory, oak-chestnut, oak-pine, southeastern evergreen, beech-maple, maple-basswood, hemlock-white pine northern hardwoods. In areas where the climate got wetter, plant biomass increased in 20 years, whereas in areas that got drier, there was significant decrease in biomass. The new forest regions are more diverse and less species dominant. The new regions are as follows: mesophytic, Appalachian oak section, oak-hickory, oak pine section, Mississippi alluvial plain, subtropical evergreen, beech-maple-basswood, Northern hardwoods-red pine, Northern hardwoods-hemlock.

Research from Purdue University cited hardwoods moving west and softwoods heading north in the last 30 years. Red maple, scarlet oak, and sweet magnolia have averaged 1.5 kilometers per year each in range. Red pine, short-leaf pine, and bald cypress average 1 kilometer in range per year. US Forest Service research shows that there are 10 forest types in the eastern US. The research models for climate change show that by 2100 the maple-beech-birch, aspen-birch, white-red-jack pine, and spruce-fir forest types will be in Canada and no longer in the US.

Keystone species will be impacted by climate change. Sugar maples are found across the Midwest and New England states. US Forest Service research models for climate change show that by 2100 they will find sugar maples in the US states that border Canada (MN, WI, MI, PA, NY, VT, NH and ME). American beech is found in the eastern US and by climate change models predict in 2100, the beech will have a range only in the New England states. The Eastern hemlock current range is the Midwest, Appalachian Mountain region, and New England states. In 2100 its range will be northern states along the Canadian border and pockets in the Appalachian Mountain range. Hemlock supports the brook trout ecosystem and many salamanders. Hemlocks impact the water hydrology of the forest. Losing hemlock will definitely impact the eastern forests and Appalachian mountain range. White oak is the important keystone species supporting 2300 species. It is very important to humans and wildlife. White oaks have more individual biomass than any other species. It is critical to the timber industry and as well as the bourbon distributors. The ecosystem will be impacted by the loss of white oak trees. The white oak is found in the eastern half of the US. The US Forest Service climate change models predict it will only be located in the upper Midwest and New England states. River birch is very important to the water hydrology of the forest. The current range is from New England to Florida. Models predict the range will be limited to the upper Midwest and New England states. Black cherry supports 500 species of butterflies, moths and pollinators. It is found in the eastern US, and models show that its future range will be upper Midwest and New England States.

The Morton Arboretum, University Researchers, and private arboriculture/tree service companies are funding efforts to look at what trees will be resilient in hotter and wetter climates. For example, black maple, a subspecies of sugar maple will be tolerant of hotter temperature and wetter conditions than sugar maples. The White oak group will do better in hotter and wetter weather than the red oak group. Trees can be categorized by their preference for, or ability to tolerate, certain sets of environmental conditions: tough (poor), intermediate, and good (sensitive trees). Locust would be an example of a tough tree, a Kentucky Coffee would be an intermediate tree, and a good tree would be an American Beech. Each planting site in an urban area must be reviewed to see if it's poor, intermediate, or good prior to planting trees. Each site must be for a small growing, medium growing, or large tree base on the cubic volume of soil. Finally, you plant trees based on the 10-20-30 rule of planting. You should plant no more than 10 % of a species, no more than 20% of a genus, and 30% of a family. Shingle oak is the species, Quercus is the genus and Fagaceae is the family (Beech & Oaks). The goal is to plant the right tree in the right place using criteria to evaluate the site.

Find out more by watching a recent *Changing Climate and Trees* workshop in Butler County. Presenters are the author of this article and Aaron Wilson from OSU's Byrd Polare and Climate Research Center <https://osu.zoom.us/rec/share/dqaalhxBYIHFEEnqk-zcqALPD08iRr9NPXLjv1vOiKDkaYUub1NLXFNECavTiwy6Mo.h1LaG3nRNb1i2yTh>

101 Alternatives to the Chalkboard Conference

October 7 at Camp Kern, Oregonia

The "101" Conference is THE weekend outdoor education experience designed to inspire teachers and outdoor educators with creative ways to provide exciting learning experiences. Enjoy meaningful large and small group sessions, excellent company, and fine eating.

Where: YMCA Camp Kern, 5291 St Rt 350 Oregonia, OH 45054

More details: will be posted at www.eeco-online.org soon.

Schedule: No formal sessions or events will be held on Friday or Sunday, but all are welcome. Check in on Friday at 6:30pm. **Saturday** will consist of a bird hike and small group sessions.

To register or for more information, contact: Dave Moran, dmoran@daytonymca.org 513-932-3756 x1527

This event is made possible by the Environmental Education Council of Ohio
and the Ohio Environmental Education Fund.



How Habitat Boards Can Help Build Wildlife Connections with Students

By Emily Horne, Greenacres Foundation

Snakes, rodents, and invertebrates are vitally important to our native ecosystems, yet many people associate these animals as pests because of various forms of media portraying them as evil and dirty (Patrick, 2017). To help combat this, many environmental educators try to teach students about these less charismatic species, but face difficulties finding these animals in their natural habitat, especially snakes. This is because many of these animals survive day-by-day hiding in dark places where they can find food, thermoregulate, and stay safe from predators. Studies show that when students see a wild animal up close in their natural habitat it

has the potential to dramatically increase their personal connection with them (Patrick, 2017). A great way to accomplish this is to use habitat boards, also known as cover boards. Habitat boards are usually made up of metal or composite roofing, wood, and other materials. These boards can be placed in a variety of habitats along trails for easy access and are usually made to be easily picked up to view animals underneath. They give a safe place for a variety of animals to hide while allowing them to be visible to students and participants without needing to trap them (Dorcas and Willson, 2009). Common animals you could see under them include a variety of insects, slugs, snails, spiders, mice, voles, frogs, salamanders, and snakes.

The type of material and placements of the boards are what commonly dictate what kind of animals will use them (Travis, 2016). Generally, snakes such as garters are more likely to be found under larger boards made from roofing in a nice sunny area such as a field. Animals like salamanders and snails are more likely to be found under boards made up of wood such as old plywood put in a nice wet and shady spot, such as near a stream or in the forest. Habitat boards can be left out year round, but should only be lifted in temperatures above 40°F since dramatic cold temperatures could harm animals using them to hide from the cold. Habitat boards are commonly used for programming at Gre-



enacres Foundation and can be found at all the environmental education sites. They are great teaching tools for all sorts of lessons including adaptations, ecosystems, ecology, and even when studying the scientific method. Participants of all ages are consistently amazed by what is found under these boards. From rodent nests in the spring filled with adorable babies, to entire groups of snakes using the board to warm up without being on display, to ant colonies, groups of slugs, and even families of salamanders; many times students who come back ask to lift them up again and again. This simple tool has made many kids go from scared of these creatures, to excited to see them over and over.

WILD About Phenology-Why is it Important?

By Jen Dennison, ODNR Division of Wildlife

What is Phenology? It's the study of seasonal changes in plants and animals, in short. Observations are made on a regular basis to identify when life cycle events occur and are recorded for scientific research. But, why do we care when the first hummingbird appears at our feeders? Why is it important to note when the redbuds are blooming? All of these occurrences, called phenophases, tell a story, and an important one at that.

The timing of phenophases tell scientists a lot about the health of a habitat or population, how temperature and climate are affecting these populations and, most importantly, how plants and animals are dealing with climate change.

A scenario that is illustrated in the Project WILD activity "Phenology at Play" involves the relationship between Acadian flycatchers, forest tent caterpillars, and oak trees. In the skit portrayed in the activity, the flycatchers come back from their southern migration areas to find their oak trees, in which they nest, being eaten by tent caterpillars. The oak trees ask the flycatchers for help and the birds oblige by eating the caterpillars and helping to protect the trees. While this is obviously an anthropomorphized skit designed to get students to identify with the creatures involved, it does a great job of identifying both phenophases in each species and how their phenophases are connected and rely on each other.

What happens when the timing is off? The term is "phenological mismatch" and it means that one or more of the species in the relationship is not using the same cues that determine when their phenophases occur. Many species of plants and animals rely on temperature and daylight length to know when to breed, bloom, bud, and more. But some species, especially migratory species, use different cues that are not as well known. If the oak tree, over time, leafs out earlier and earlier due to increasing temperatures earlier in the spring, the moth will know to lay its eggs



Forest Tent Caterpillar, photo from whatsthatbug.com

earlier so that its caterpillars will be able to feed on young, tender leaves. But if the flycatcher continues to come back at the same time as it always has, the caterpillars that it relies on to feed its young will either be too large or not accessible in their tent cocoons. This will force the adult flycatchers to try to find food elsewhere that may not be as nutritious to their young.

These kinds of scenarios are happening all over the world. These phenological mismatches are becoming one of the biggest reasons for population declines in many species of plants and animals. Changes in our climate are causing plants to bloom, leaf out, bud, and drop leaves earlier or later each year, depending on the species and their location. If animals that rely on these plants don't adjust, their populations may decline over time.



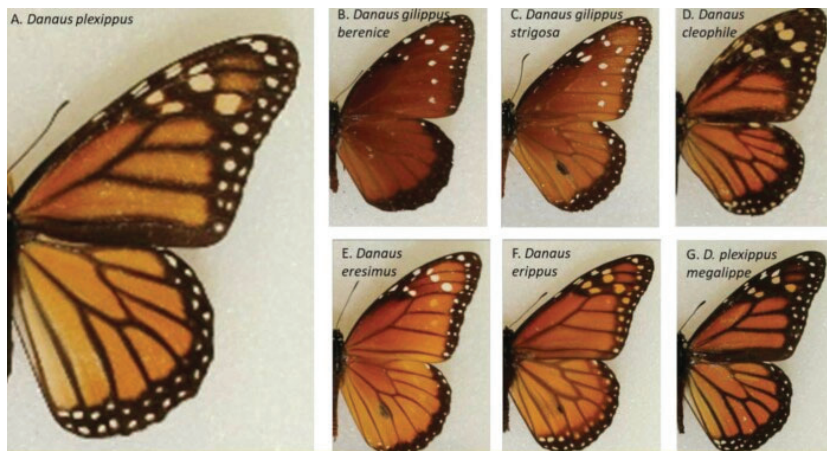
Acadian flycatcher, photo from All About Birds

The National Phenology Network's Nature's Notebook is an excellent tool to help educators use phenology to explain how these relationships between species work and why they're important. When students are making observations and comparing them to other groups' work and contributing to real scientific studies, they begin to understand why climate change is important and the effects it can have on our environment. Nature's Notebook is easy to use and can be done with an app on your phone or tablet. For more information about Project WILD, contact the Ohio Division of Wildlife at 1-800-WILDLIFE or outdoor.education@dnr.ohio.gov For more information about Nature's Notebook, check out their website at Nature's Notebook | USA National Phenology Network (usanpn.org)

Great Monarch Migration Seems to Owe Success to White Spots on the Butterfly's Wings

By the Good News Network

Monarchs are the only insects to attempt such a massive trek as the one from Canada to Mexico—and the success of this butterfly's 3,000-mile journey may come down to how many white spots are on their wings.



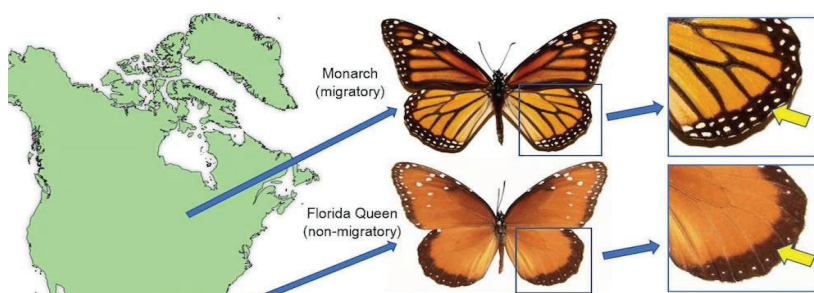
University of Georgia / P. Barriga

A new study by University of Georgia researchers suggests that the butterflies with more white spots are better at reaching their long-distance wintering destination. Although it's not yet clear how the spots aid the species' migration, it is believed the spots change air-flow patterns around the wings.

For thousands of years, the orange-winged wonder has been traversing North America to spend the winter in oyamel fir trees in the mountain forests in south and central Mexico. How an animal with a brain the size of a poppy seed navigates to this one special place has baffled ecologists for decades. "We undertook this

project to learn how such a small animal can make such a successful long-distance flight," said lead author Andy Davis, an assistant researcher in the University's Odum School of Ecology. "We actually went into this thinking that monarchs with more dark wings would be more successful at migrating because dark surfaces can improve flight efficiency. But we found the opposite." "It's the white spots that seem to be the difference maker," Davis said.

The researchers analyzed nearly 400 wild monarch wings collected at different stages of their journey, measuring their color proportions. They found the successful migrant monarchs had about 3% less black and 3% more white on their wings. An additional analysis of museum specimens that included monarchs and six other butterfly species showed that the monarchs had significantly larger white spots than their non-migratory cousins. The only other species that came close to having the same proportion of white spots on its wing was its semi-migratory relative, the southern monarch.



University of Georgia / P. Barriga

The coloring is related to the amount of light and heat they receive during their journey. More white spots means less exposure to the sun's radiation. "The amount of solar energy monarchs are receiving along their journey is extreme, especially since they fly with their wings spread open most of the time," Davis said. "After making this migration for thousands of years, they figured out a way to capitalize on that solar energy to improve their aerial efficiency." But as temperatures continue to rise, altering the solar radiation reaching Earth's surface, monarchs will likely have to adapt to survive, said Mostafa Hassanalani, co-author of the study and an associate professor at the New Mexico Institute of Mining and Technology.

But it's certainly not all bad news for the flying insects. Davis' previous work showed that summer populations of monarchs have remained relatively stable over the past 25 years. That finding suggests that the species' population growth during the summer compensates for butterfly losses due to migration, winter weather and changing environmental factors. "The breeding population of monarchs seems fairly stable, so the biggest hurdles that the monarch population faces are in reaching their winter destination," Davis said. "This study allows us to further understand how monarchs are successful in reaching their destination."

The study, sub-titled "How the monarch got its spots," was published in PLOS ONE. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0286921>

Climate, Water and Resilience from Project WET and More!!!

Climate, Water and Resilience is the newest curriculum from Project WET. This newest curriculum helps educators teach middle and high school students about climate and climate change using interactive, objective, science-based activities that students will enjoy. Unlike other Project WET publications, the activities in this guide are meant to be taught in sequential order. Each lesson is a stand-alone activity and can be taught in modules; however, information from the first activity will help students to understand the second activity, which will then help them to understand the third activity, and so on.

Workshops are offered by the Ohio EPA, Office of Environmental Education (OEE) and are usually in conjunction with Project WET 2.0. curriculum. These workshops are roughly four to six hours in length and each participant will leave the workshop with both curriculums. More than 70 interactive activities, with many other resources that compliment each curriculum. Workshops can be held as stand-alone trainings and it is recommended that these events be at least two to four hours and can only be offered by Project WET Facilitators from across Ohio.

If you would like to become an educator/facilitator for Project WET, please reach out to the OEE staff and Project WET State Coordinator, Dennis Clement, dennis.clement@epa.ohio.gov or 614-644-2048. More details can be found at <https://epa.ohio.gov/divisions-and-offices/environmental-education/training/project-wet>.

Many resources for teaching climate change were compiled by WET (Topic: Climate | Project Wet) and in collaboration with Project Learning TREE and Project WILD Teaching About Climate Change Water, Trees, and Wildlife (WET WILD PLT Teaching Climate (www.projectwet.org) are all the electronic.

Training and workshops (all resources) can be included any Ohio Environmental Education Fund (OEEF) Ohio Environmental Education Fund | Ohio Environmental Protection Agency Grant Application. The cost of books, supplies, creating climate change trunks, etc. are just a few

Appalachian Green Teachers Conference

October 27-28
Burr Oak Lodge
and Conference Center
Glouster, OH

Join us for the 10th Annual Appalachian Green Teachers Conference Oct. 26-27 at Burr Oak Lodge & Conference Center! This two-day hands-on experience is for teachers and non-formal educators interested in environmental education.

Seeking Proposals: Want to share your passion for sustainability, innovative teaching methods, or eco-friendly initiatives by hosting a workshop at the conference? Interested educators should submit their proposals by Wednesday, August 23.

Have questions? Contact Rural Action Environmental Education Director, Dan Voresik, dan@ruralaction.org

Register: <https://tinyurl.com/AppalachianGreen>



Environmental Career Ambassadors

Environmental Career Ambassadors are environmental professionals willing to make classroom or school career fair presentations for middle and high school grades about their careers and/or provide shadowing, internship, field trip, and scholarship opportunities to Ohio students. <https://eeco.wildapricot.org/eca>

For Schools- If you would like to have a Career Ambassador come to your classroom or event, please contact the EECO Executive Director director@eeco-online.org.

For Environmental Professionals - If you would like to be more involved by volunteering to be a Career Ambassador, please contact the EECO Executive Director director@eeco-online.org. You can also check out the the Environmental Professionals Network (EPN) hosted by the School of Environment and Natural Resources at The Ohio State University. <https://epn.osu.edu/>.

Contact EECO

Partnerships strengthen EE in Ohio, leading to a more environmentally literate population and a healthier environment. You are welcome to become a partner and friend to EECO. Please contact any of our regional directors, officers, advisors, and board members to find out more about becoming a part of EECO.

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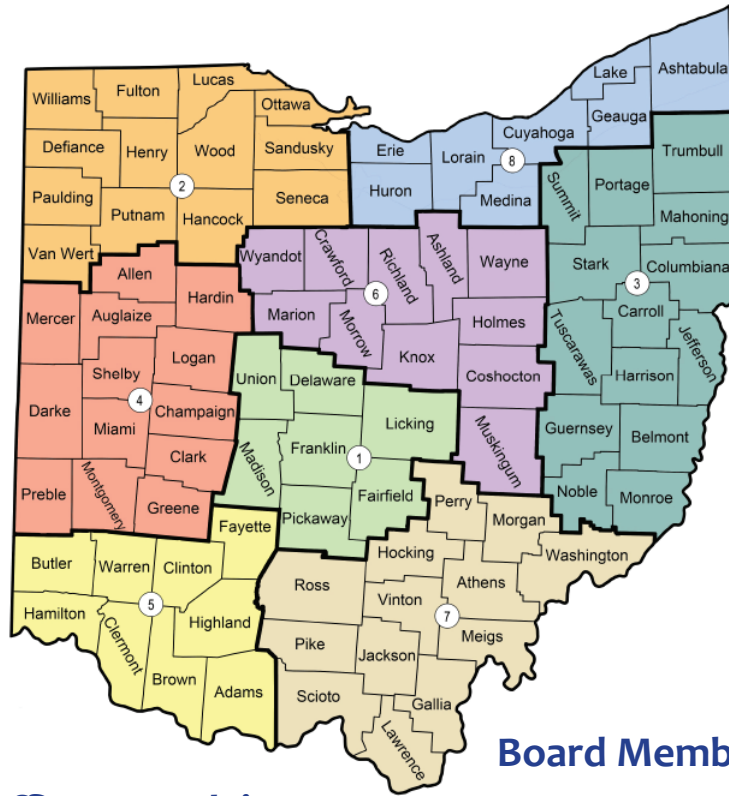
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